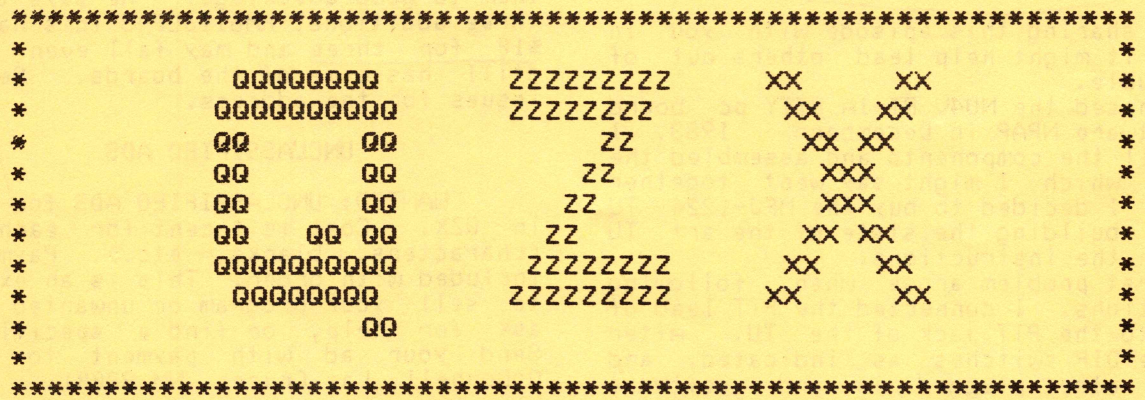

The Journal Covering Amateur Radio & Sinclair Computers
ZX-80; Micro-Ace; ZX81; T/S 1000, 1500, & 2068
2025 O'Donnell Drive
Las Cruces, New Mexico
88001

K5XY
Alex. F. Burr
Publisher

W4GHV/5
Bo Barry
Editor

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* Hints on MFJ-1224 TU, KE6WB
* QZX Friends
* Unclassified Ads
* Deluxe Antenna Program (2068), N8BIF
* Repeater Directory Program, K5MIL

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Hints on the MFJ-1224 TU
Ed Truszkowski KE6WB

I am sharing this episode with you in hopes that it might help lead others out of similar trouble.

I purchased the NU4V RT-1A RTTY pc board and the software NRAP in December 1983. I purchased all the components and assembled the I/O board, which I might say went together quite well. I decided to buy the MFJ-1224 TU instead of building the state of the art TU described in the instructions.

My first problem arose when, following the instructions, I connected the PTT lead of the RT-1A to the PTT jack of the TU. After setting the DIP switches as indicated, and everything else plugged in and software loaded, the transmitter would not key. I finally connected the PTT lead to the CW key terminal and it worked ok. BUT I could not get anything but a space tone. Upon discussing the problem with Warren, WA6OUC, on the 40 meter QZX net, it was suggested that I install a 3.3 K resistor in parallel with the SOUT lead of the RT-1A I/O board and the 5 volt supply trace. That additional resistor got me a shift. BUT ... I operated with this arrangement on the HF bands all this time and I thought that all was fine. Just recently I decided to extend my RTTY operating to the 2 meter band. The reports I got were all the same, my mark tone was too high in frequency. The first thing I did was check and adjust the mark and space tones of the TU. I still had the problem. What eventually did the trick was closing DIP switch 2 on the TU. The original instructions called for setting 4 and 8 to ON and 6 to OFF. I know that, from the reports, I was sending a mark tone high in frequency and that it probably was the CW tone of 2210 hz.

I never would have realized my hardware problems had I not worked VHF through a repeater.

QZX FRIENDS

W4DRM -- Perry writes that he has a T/S 2068 with a 2050 Modem and a 2040 printer. He also has a T/S 1000 with 16K RAM and a ZX80 which he built from a kit in the old days.

SM3HBQ -- Hans says he is the pastor of a church (and the janitor too), teaches computer languages at school, and runs a small computer business. He sells Sinclair disk drives and a neat RTTY program for the Spectrum (see ads in the two previous QZX's.) (He also distributes QZX thoughout the Scandinavian countries.)

WD0DCK -- Anthony says he has a T/S 1000 and a new 16K ROM which is a big improvement. He bought himself a T/S package deal of computer, printer, and assorted software for his birthday.

KE6WB -- Ed has two T/S 1000's, one in the shack and the other in the house. He also has a 2040 printer and runs the NU4V RT-1A RTTY pc board. He recently made a RTTY contact with Japan.

KA2LHO -- Kraig writes to say that he passed his oral examination for a Master's degree. Congrat-ulations!

Paul Hunter, who's ads for his famous HUNTER BOARD has been appearing for quite some time, says that many amateurs have been using them to good advantage. He says the price of three additional HM6116LP-3 ic's has fallen to $10 for three and may fall even lower. He still has some of the boards. See previous issues for the address.

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

WANTED: Z-80 computer. Working condition. Edward L. Radtke, 1602 Woodluck Avenue, Louisville, KY 40205.

FOR SALE: TIMEX/SINCLAIR TS-1000 computer with 16k RAM pack and Memotech full stroke keyboard, plus assortment of cassette software, $125. Add shipping. Mel Zwillenberg, 475 Richmond Ave., Dept. QZX, Maplewood, NJ 07040.

FOR SALE: The ORIGINAL HAM LOG for the TS/ZX plus many other HAM/SWL programs. RTTY/CW for TS1000/ZX81, assembled and tested I/F and program. SASE for more info. Ken Carpenter, KC4UG, Box 586, Vernon, AL 35592

FOR SALE: CONRAC green screen 9" monochrome monitor. (Surplus, used.) Requires 12 volt 1. amp. D.C. supply. Works, but needs some adjustment. AS IS, $25. Mel Zwillenberg, 475 Richmond Ave., Dept. QZX, Maplewood, NJ 07040.

FOR SALE: MORSE CODE TRANSLATOR. TS1000/TS1500/ZX81 version: Code received through "ear" jack is scrolled across screen - NO EXTRA HARDWARE NEEDED. Also generates code from strings, $9.95 + $1.00 S&H. TS2068 version: Same as above but with more features like type ahead buffer and hardcopy from TS2040 printer. $15.95 + $1.00 S&H. THOMSON SOFTWARE, PO BOX 1266, LOMBARD, IL 60148.

FREE LIST of new and used (but excellent condition) software, books, hardware for the TS-1000/1500 and Sharp/Radio Shack Pocket Computers. Some ATARI items and color graphics printing services too. Send Self Addressed Stamped Envelope to: Mel Zwillenberg Cameras $ Computing, Dept. QZX, 475 Richmond Ave., Maplewood, NJ 07040. (Note new address.) For camera list too, add another postage stamp.

WANTED: NU4V CW interface or equivalent. $20.00 OBO. John Roland, 515 Butler, Grass Vaalley, CA 95945

FOR SALE: Plastic strips to allow QZX to easily be placed in a three ring binder. Twelve reusable strips $3 postpaid. See Mr 85 issue for more details. Alex. F. Burr, K5XY, 2025 O'Donnell, Las Cruces, NM 88001.

Deluxe Antenna Program (2068)

Terry Dalby, N8BIF
112 Dana Lane
Marquette, MI 49855

This program's three main functions are graphics (drawing the antennas & baluns), calculation (the actual measure-ment of the antenna), & data recall (the specific info such as impedance, velocity factor, & attenuation at a particular frequency). The entry point is line 90 and after typing in the program, you should SAVE "antenna" LINE 90. There is a great deal of data available to the user and I like to think that is it very accurate but as you know, there are many variables that cannot be accounted for.

The only precautions in using this program are when entering the resonant frequency, it is in MHz. The apex or beam height is measured in feet. Finally, when asked for the velocity factor if you don't use the chart, enter it as a number between 1 & 100. Readers not interested in typing in the program can send $8.00 for a tape, printed listing, & instructions.

Miscellaneous extras: My broken ZX-81 printer was sent off to England for repair and returned in LESS than a month, with the total charge of $13.00. Up and running at this QTH is the NU4V RTTY and AD7I AMTOR unit (described in Feb. '84 QST). Debugging it and errors in schematic were trying, send a SASE for details if desired. Hopefully AD7I will consider my request for including a packet TNC program to the ZAMTOR.

EPROM Programmer..... $80.00
with computer cable..... $99.95

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+ 5' 5-1/4" drive cable... $199.95

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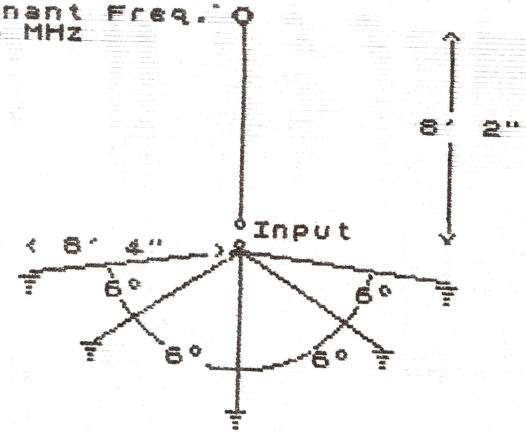
A dipole resonant at 28.6 MHz.

Each leg of the dipole for would be 8' 7" long.

The input impeadance for this antenna would be @ 79Ω.



Resonant frequency - 28.6 MHz

< 17' 2" >
<8' 7" > <8' 7" >

Each leg is @ 8' 7" long.

And the overall length should be 17' 2"

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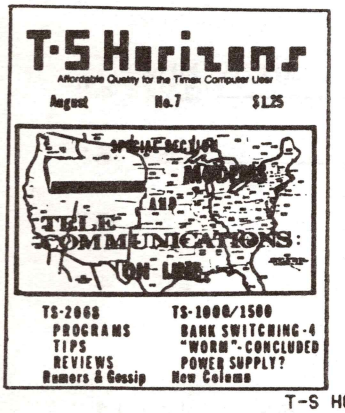

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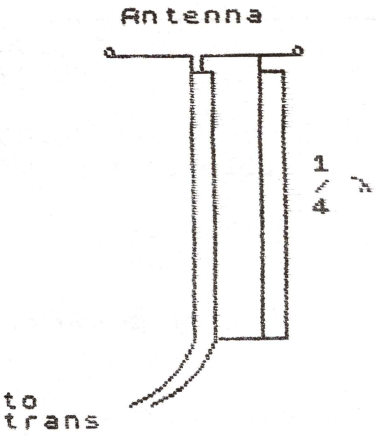
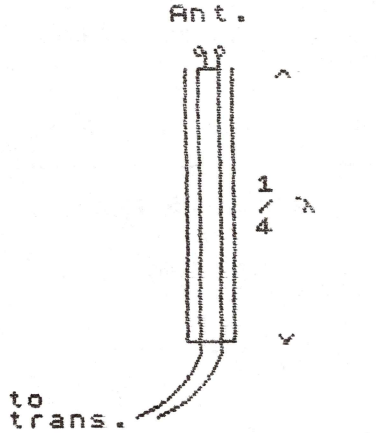


This type of coaxial balun requires an electrical 1/4 λ stub be soldered from sheild to shield at the bottom & from shield to center at the top.

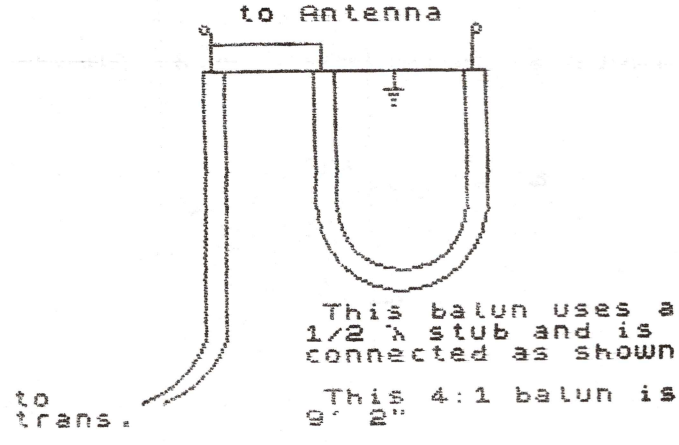
In this case the stub is 4' 7"



For this type of balun, a metal sleave is soldered t@ the sheild 1/4 λ from the end and left open at at the top.

The antenna connects to the center & the sheild.

The sleave should be 4' 7"



This balun uses a 1/2 λ stub and is connected as shown

This 4:1 balun is 9' 2"

Resonant frequency-28.6 MHz

Side dimension	
Reflector and driven -	8' 8"
Each director -	8' 4"
Total loop length	
Reflector and driven -	34' 8"
Each director	33' 6"
Spacing at .11λ	4' 2"
Stub length	17"

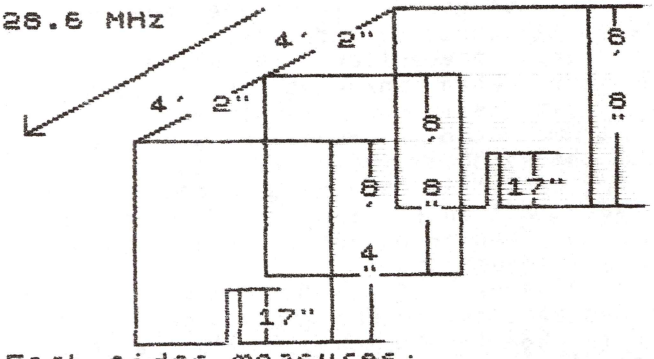
Remember that the stub width should be 3" for 30MHz and below 2" at 50MHz, and 1" above that. The width is [illegible] included.

The forward gain of a 2 element quad is about 7.3dB and for a 3 element quad it is 9.3dB.

The radiation angle with an Apex height at 45' is @ 11°.

TUNING Adjust the stub on the reflector for a minimum S meter reading while the antenna is pointing away from a near by station.
Adjust the stubs on directors for maximum S meter reading while the antenna is pointed toward the local station.

The front to back ratio of a properly tuned quad is at least 25 dB. If you measure less, readjust the reflector.



Each sides measures:
Ref. & Driven - 8' 8"
Director - 8' 4"

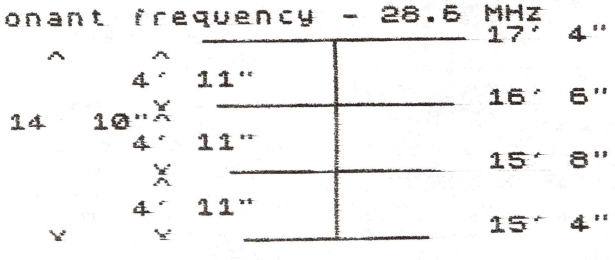
Spacing between elements - .11λ

Resonant Frequency-28.6 MHz

Second Director length -	15' 4"
First Director length -	15' 8"
Driven element length -	16' 6"
Reflector length -	17' 4"
Space the elements - using a .15λ spacing	4' 11"

Forward gain for a 3 element yagi is @ 7.7 dB and 8.9 dB for the 4 element.

Resonant frequency - 28.6 MHz



Turning radius - 11'0"

Element spacing at .15λ - 4' 11"

Overall boom length - 14' 10"

```
  1 DATA 128,128,128,128,128,12
8,128,255
  3 DATA 0,192,16,8,12,18,18,0
  5 DATA 0,24,36,66,0,0,0,0
  7 DATA 0,0,0,0,66,36,24,0
  9 DATA 0,0,24,36,36,165,36,0
 12 DATA 24,36,36,24,0,0,0,0
 14 DATA 24,60,66,195,195,66,60
,24
 16 DATA 255,0,60,0,24,0,24,0
 20 FOR n=USR "a" TO USR "h"+7:
 READ a: POKE n,a: NEXT n
 30 DIM y$(32,11,4)
 31 DATA 52,66,29.5,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 32 DATA 50,80,25.4,.27,.44,.62
,.76,.9,1.2,2.2,3.9
 33 DATA 52,66,29.5,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 34 DATA 51,66,30,.36,.55,.84,1
.1,1.25,1.75,2,2.6
 35 DATA 51,66,30,.36,.55,.84,1
.1,1.25,1.75,2,2.6
 36 DATA 50,66,30.8,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 37 DATA 75,66,20.6,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 38 DATA 75,80,16.9,.27,.44,.62
,.76,.9,1.2,2.2,3.9
 39 DATA 75,66,20.6,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 40 DATA 75,66,20.6,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 41 DATA 75,66,20.6,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 42 DATA 52,66,29.5,.125,.19,.3
,.36,.48,.65,1.3,1.75
 43 DATA 52,66,29.5,.125,.19,.3
,.36,.48,.65,1.3,1.75
 47 DATA 53.5,66,28.5,.65,1,1.5
,1.8,2.3,3.2,5.7,8.25
 48 DATA 53.5,79,28.5,.52,.8,1.
1,1.4,1.7,2.2,4.1,7.1
 49 DATA 53.5,66,28.5,.52,.8,1.
1,1.4,1.7,2.2,4.1,7.1
 50 DATA 53.5,66,28.5,.65,1,1.5
,1.8,2.3,3.2,5.7,8.25
 51 DATA 50,66,30.8,.52,.8,1.1,
1.4,1.7,2.2,4.1,7.1
 52 DATA 73,66,21,.52,.8,1.1,1.
4,1.7,2.2,4.1,7.1
 53 DATA 75,79,16.9,.48,.7,1,1.
2,1.4,2,3.4,6.1
 54 DATA 73,66,21,.52,.8,1.1,1.
4,1.7,2.2,4.1,7.1
 55 DATA 93,86,13.5,.48,.7,1,1.
2,1.4,2,3.4,6.1
 57 DATA 93,86,13.5,.48,.7,1,1.
2,1.4,2,3.4,6.1
 60 DATA 50,66,30.8,2.3,3.4,4.6
,5.3,6.1,8,30,40
 61 DATA 50,66,30.8,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 62 DATA 50,66,30.8,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 63 DATA 75,66,20.6,.36,.55,.84
,1.1,1.25,1.75,2,2.6
 64 DATA 50,81,25,.1,.1,.27,.35
,.40,.55,1,1.8
 65 DATA 50,81,25,.1,.14,.225,.
26,.35,.46,.8,1
 66 DATA 50,81,25,.05,.11,.155,
.21,.26,.35,.67,.84
 67 DATA 75,81,16.7,.1,.1,.34,.
4,.48,.6,1.2,1.9
 68 DATA 75,81,16.7,.1,.14,.225
,.27,.35,.45,.85,1.2
 80 FOR n=1 TO 32
 81 FOR m=1 TO 11: READ a
 82 LET y$(n,m)=STR$ a
 83 NEXT m
 84 NEXT n
 89 RETURN
 90 REM ******* Copyright 1984
byTerry L. Dalby N8BIF *******
 91 BORDER 6: PRINT INK 0; PAPE
R 6;AT 3,5;"N8BIF - ANTENNA DESI
GN"
 92 PRINT '''"This program will
 provide most  of the needed ele
ctrical infor- mation to success
fully design:";'''TAB 16;"QUADS"
;TAB 16;"YAGIS";TAB 16;"VERTICAL
S";TAB 16;"DIPOLES";'''TAB 0;"an
d also provide some hints on  co
axial baluns. The computationsar
e accurate to 220 MHz."
 99 GO SUB 1
100 CLS
110 PRINT AT 5,0;"What kind of
antenna are you     interested in
?"
111: PRINT ''TAB 10; FLASH 1;"E
"; FLASH 0;"xit";'';TAB 10; FLASH
 1;"Q"; FLASH 0;"uad";'';TAB 10;
FLASH 1;"Y"; FLASH 0;"agi";'';TAB
 10; FLASH 1;"V"; FLASH 0;"ertic
al";'';
112 PRINT TAB 10; FLASH 1;"D";
FLASH 0;"ipole": PRINT : PRINT T
AB 10; FLASH 1;"F"; FLASH 0;"eed
 lines and coaxial";TAB 15;"balu
ns";
115 LET go=100
120 IF INKEY$="" THEN GO TO 120
130 IF INKEY$="q" THEN LET go=1
000: GO TO 200
140 IF INKEY$="y" THEN LET go=2
000: GO TO 200
150 IF INKEY$="v" THEN LET go=3
000: GO TO 200
160 IF INKEY$="d" THEN LET go=4
000: GO TO 200
170 IF INKEY$="f" THEN LET go=5
000: GO TO 200
185 IF INKEY$="e" THEN CLS : PR
INT AT 10,10;"Good-bye!": PAUSE
40000: STOP
190 GO TO 100
200 CLS
210 PRINT '''"Enter the resonan
t frequency of your antenna.";:
INPUT a: PRINT "  -  ";a;" MHz"
220 GO TO go
300 LET a1=INT (992/a): LET aa1
=((992/a)-a1)
310 RETURN
320 LET a1=INT (960/a): LET aa1
=((960/a)-a1)
330 RETURN
400 LET z$=STR$ a1+"'"
410 IF aa1>0 THEN LET z$=z$+" "
+STR$ (INT (aa1*12))+""""
420 RETURN
1010 PRINT '''"Apex height is ";:
 INPUT b: PRINT b;"'"
1020 LET ang1=(b/(1000/a))+(.1*(
b/(1000/a)))
1030 IF ang1>1 THEN LET ang1=1.1
1040 LET ang=INT (13/ang1)
1120 LET a=a*4: GO SUB 320: LET
a=a/4
1121 GO SUB 400
1122 LET a$=z$
1124 GO SUB 320
1125 GO SUB 400
1126 LET b$=z$
1130 LET a=a*4: GO SUB 300: LET
a=a/4
1135 GO SUB 400
1140 LET s$=z$
1160 GO SUB 300
1170 GO SUB 400
1180 LET t$=z$
1190 LET a=a*8: GO SUB 320: LET
a=a/8
```

```
1191>GO SUB 400
1192 LET c$=z$
1193 LET a=a*22.6: GO SUB 320: L
ET a=a/22.6
1194 LET u$=STR$ (INT ((aa1+a1)*
12))+""""
1200 CLS : PRINT "Resonant frequ
ency-";: BRIGHT 1: PRINT a;" MHz
": BRIGHT 0: PRINT '': PRINT "S
ide dimension": PRINT "Reflecto
r and driven -";TAB (32-LEN s$);
s$
1205 PRINT "Each director -";TAB
 (32-LEN a$);a$'
1210 PRINT "Total loop length":
 PRINT "Reflector and driven -";
TAB (32-LEN t$);t$'
1215 PRINT "Each director -";TAB
 (32-LEN b$);b$'
1220 PRINT "Spacing at .11λ";TAB
 (32-LEN c$);c$'
1230 PRINT "Stub length";TAB (32
-LEN u$);u$'
1240 PRINT '"Remember that the s
tub width    should be 3"" for 3
0MHz and below2"" at 50MHz, and
1"" above that. The width is ▓▓▓▓
 included."
1250 OVER 1: PRINT AT 16,0;"____
____": OVER 0
1255 PRINT AT 21,14;"Copy?"
1256 IF INKEY$="" THEN GO TO 125
6
1257 IF INKEY$<>"y" THEN GO TO 1
259
1258 PRINT AT 21,14;"      ": COP
Y
1259 CLS
1265 PRINT "The forward gain of
a 2 element quad is about 7.3dB
and for a 3 element quad it is 9
.3dB.": PRINT '
1266 PRINT "The radiation angle
with an Apexheight at ";b;"' is
@ ";ang;"°.": PRINT '
1267 PRINT "▓▓▓▓▓▓  Adjust the s
tub on the   reflector for a mini
mum S meter  reading while the an
tenna is     pointing away from a
 near by     station."
1268 PRINT "Adjust the stubs on
directors    for maximum S meter
reading      while the antenna is
 pointed     toward the local sta
tion.": PRINT '
1269 PRINT "The front to back ra
tio of a     properly tuned quad
is at least 25 dB. If you measur
e less,      readjust the reflect
or."
1290 PRINT AT 21,14;"Copy?"
1291 IF INKEY$="" THEN GO TO 129
1
1292 IF INKEY$<>"y" THEN GO TO 1
294
1293 PRINT AT 21,14;"      ": COP
Y
1294 CLS
1300 LET z=50: LET y=50
1305 PRINT BRIGHT 1;AT 0,0;a;" M
Hz"
1310 FOR n=0 TO 2: PLOT z,y
1320 INK n: DRAW 75,0: DRAW 0,75
: DRAW -75,0: DRAW 0,-75
1330 LET z=z+50: LET y=y+25
1340 NEXT n
1360 DRAW 35,0: DRAW 0,20: DRAW
5,0: DRAW 0,-20: DRAW INVERSE 1;
-5,0
1370 BRIGHT 0: INK 0
1410 PRINT AT 5,1;"L"
1415 FLASH 1
1420 PLOT 100,175: DRAW -92,-47
1425 PLOT 90,50: INVERSE 1: DRAW
 -5,0: INVERSE 0: DRAW 0,20: DRA
W 20,0: DRAW -15,0: DRAW 0,-20:
PLOT 100,50: DRAW 0,20
1426 PRINT AT 14,12;u$
1430 PLOT 150,175: DRAW -100,-50
1440 DRAW 95,0: PLOT 125,50: DRA
W 20,0
1450 PLOT 140,50: DRAW 0,75
1460 LET z=6: FOR g=1 TO LEN a$:
 PRINT AT z,17;a$(g): LET z=z+1:
 NEXT g
1470 PLOT 162,75: DRAW 0,75
1480 PRINT AT 4,7;c$;AT 1,13;c$
1490 LET z=5: FOR g=1 TO LEN s$:
 PRINT AT z,20;s$(g): LET z=z+1:
 NEXT g
1500 PLOT 225,100: DRAW 20,0: DR
AW -10,0: DRAW 0,75: DRAW 10,0:
DRAW -20,0
1510 LET z=1: FOR g=1 TO LEN s$:
 PRINT AT z,29;s$(g): LET z=z+1:
 NEXT g
1520 PLOT 192,120: DRAW 20,0: DR
AW -9,0: DRAW 0,-20
1530 PRINT AT 8,24;u$
1535 FLASH 0
1540 PRINT AT 16,0;"Each sides m
easures:"'
1550 PRINT INK 2;"Ref."; INK 0;"
 & "; INK 1;"Driven"; INK 0;" -
";s$'
1560 PRINT "Director       - ";a$
'
1570 PRINT "Spacing between elem
ents  - .11λ"
1600 PRINT AT 21,14;"Copy?"
1610 IF INKEY$="" THEN GO TO 161
0
1620 IF INKEY$<>"y" THEN GO TO 1
640
1630 PRINT AT 21,14;"      ": COP
Y
1650 GO TO 100
2110 PAUSE 50: CLS
2115 LET a1=INT (440/a): LET aa1
=(440/a)-a1
2116 GO SUB 400
2117 LET g$=z$
2120 LET d=449.5/a
2130 LET de=473.5/a
2140 LET r=498/a
2150 LET a1=INT d: LET aa1=d-a1
2151 GO SUB 400
2152 LET d$=z$
2160 LET a1=INT de: LET aa1=de-a
1
2165 GO SUB 400: LET e$=z$
2170 LET a1=INT r: LET aa1=r-a1
2200 GO SUB 400
2210 LET r$=z$
2230 LET s=de*.3
2231 LET x=3*s
2232 LET a1=INT s: LET aa1=s-a1
2234 GO SUB 400: LET s$=z$
2235 LET a1=INT x: LET aa1=x-a1
2236 GO SUB 400: LET x$=z$
2300 PRINT "Resonant Frequency-"
;: BRIGHT 1: PRINT a;" MHz": BRI
GHT 0: PRINT '''
2305 PRINT "Second Director leng
th - ";TAB (32-LEN g$);g$
2310 PRINT "First Director lengt
h - ";TAB (32-LEN d$);d$'
2320 PRINT "Driven element lengt
h - ";TAB (32-LEN e$);e$'
2330 PRINT "Reflector length -";
TAB (32-LEN r$);r$
2340 PRINT '"Space the elements
- ";TAB (32-LEN s$);s$
2341 PRINT "using a .15λ spacing
"
2350 PRINT ';"Forward gain for a
 3 element    yagi is @ 7.7 dB a
nd 8.9 dB for the  4 element."
2400 PRINT AT 21,14;"Copy?"
2410 IF INKEY$="" THEN GO TO 241
0
2420 IF INKEY$<>"y" THEN GO TO 2
440
2430 PRINT AT 21,14;"      ": COP
Y
2440 CLS
2445 PRINT "Resonant frequency -
";: BRIGHT 1: PRINT a;" MHz": B
RIGHT 0
2450 PLOT 100,162: DRAW 100,0: D
RAW -50,0: DRAW 0,-75
2451 INK 4: DRAW -35,0: DRAW 70,
0: DRAW -35,0: INK 0
2452 DRAW 0,25: INK 2: DRAW -40,
0: DRAW 80,0: DRAW -40,0: INK 0
```

```
2453 DRAW 0,25: INK 1: DRAW -45,
0: DRAW 90,0: INK 0
2460 INK 0
2470 FOR n=2 TO 8 STEP 3: PRINT
AT n,10;"^": NEXT n
2480 FOR n=4 TO 10 STEP 3: PRINT
 AT n,10;"v": NEXT n
2490 PRINT AT 2,5;"^";AT 10,5;"v
"
2500 FOR n=3 TO 9 STEP 3: PRINT
AT n,9; FLASH 1;s$;: NEXT n
2509 FLASH 1
2510 PRINT AT 5,3;x$
2520 PRINT AT 1,26;r$
2530 PRINT AT 4,26;e$
2540 PRINT AT 7,26;d$
2550 PRINT AT 10,26;g$
2551 FLASH 0
2560 LET tr=SQR ((x/2)↑2+(r/2)↑2
)
2570 LET a$=STR$ (INT tr)+"'"
2580 IF tr-INT tr>0 THEN LET a$=
a$+STR$ (INT ((tr-INT tr)*12))+"""
"
2590 PRINT AT 14,0;"Turning radi
us - ";a$
2600 PRINT '"Element spacing at
.15λ - ";s$
2610 PRINT '"Overall boom length
 - ";x$
2650 PRINT AT 21,14;"Copy?"
2660 IF INKEY$="" THEN GO TO 266
0
2670 IF INKEY$<>"y" THEN GO TO 2
690
2680 PRINT AT 21,14;"      ": CO
PY
2690 GO TO 100
3000 LET a=a*4.24: GO SUB 300: L
ET a=a/4.24
3010 GO SUB 400
3020 LET a$=z$
3030 LET a=a*4: GO SUB 320: LET
a=a/4
3040 GO SUB 400
3050 LET r$=z$
3070 CLS
3080 PRINT '"With a resonant fre
quency of    ";: BRIGHT 1: PRINT
 a;" MHz";: BRIGHT 0: PRINT "...
"
3090 PRINT '';"The antenna will
be ";a$;" high."
3099 PRINT ';"And the radials sh
ould be at    least ";r$;" long.
"
3100 PRINT ''"Of course the ante
nna works bestwith the greatest
number of      radials, but a uni
form dispersalof 60 radials at 6
";"°";" should be    effective."
3110 PRINT AT 21,14;"Copy?": IF
INKEY$="" THEN GO TO 3110
3120 IF INKEY$ <>"y" THEN GO TO
3140
3130 PRINT 21,14,;"      ": COPY
3140 CLS : PRINT "Resonant Freq.
";" BRIGHT 1;a;" MHz": BRIGHT 0
3150 INK 4: PRINT AT 19,15;"╤";A
T 16,8;"╤";AT 16,22;"╤";AT 13,5;
"╤";AT 13,25;"╤"
3151 INK 0
3155 PRINT AT 10,15;"°Input";AT
11,15;"°"
3156 FLASH 0: PRINT AT 11,5;"< "
; FLASH 1;r$; FLASH 0;AT 11,14;"
>"
3160 LET a=124: LET b=83: PLOT a
,b: DRAW -80,-10: PLOT a,b: DRAW
 80,-10: PLOT a,b: DRAW 0,-59: P
LOT a,b: DRAW -55,-35: PLOT a,b:
 DRAW 55,-35
3161 PLOT a,b+12: INK 2: DRAW 0,
75: INK 0
3180 INK 1: PLOT 74,75: DRAW 100
,0,PI/1.25: INK 0
3190 PRINT AT 13,9;"6°";AT 16,12
;"6°";AT 16,19;"6°";AT 13,21;"6°
"
3200 INK 2: PRINT AT 0,15;"Q": I
NK 0
3210 PRINT AT 1,25;"^";AT 10,25;
"v";AT 5.24; FLASH 1;a$
3225 PLOT 204,163: DRAW 0,-25: P
LOT 204,125: DRAW 0,-33
3230 FLASH 0: PRINT AT 11,5;"< "
; FLASH 1;r$; FLASH 0;AT 11,14;"
>"
3240 PRINT AT 21,14;"Copy?"
3250 IF INKEY$="" THEN GO TO 325
0
3260 IF INKEY$<>"y" THEN GO TO 3
280
3270 PRINT AT 21,14;"      ": COP
Y
3280 RUN 100
4001 LET b=a
4002 PRINT '"Height above ground
 - ";: INPUT c: PRINT c;"'"
4010 PAUSE 50
4020 CLS : PRINT ''"A dipole res
onant at ";: BRIGHT 1: PRINT b;"
 MHz.": BRIGHT 0
4025 LET a=a*4.0325: GO SUB 300
4026 GO SUB 400
4027 LET a$=z$
4030 LET a=a/2: GO SUB 300: GO S
UB 400
4040 LET b$=z$
4050 PRINT ''"Each leg of the di
pole for"'"would be ";a$;" long.
"
4060 LET c1=c/(984/b)
4070 RESTORE 4080
4080 DATA 90,76,75,78,80,79,76,7
5,77
4090 FOR n=1 TO 9
4091 IF n>=(c1*10) THEN GO TO 40
95
4093 NEXT n
4094 IF n=10 THEN LET n=n+1
4095 FOR m=1 TO (n-3): READ q: N
EXT m
4100 IF c1<.3 THEN LET c$="??( T
oo low  to be accurate)"
4105 IF c1>.3 AND c1<1.2 THEN LE
T c$=STR$ q+"Ω"
4110 IF c1>=1.2 THEN LET c$="79Ω
"
4150 PRINT ''"The input impeadan
ce for this   antenna would be @
";c$
4190 PRINT AT 21,14;"Copy?"
4191 IF INKEY$="" THEN GO TO 419
1
4192 IF INKEY$<>"y" THEN GO TO 4
194
4193 PRINT AT 21,14;"      ": COP
Y
4194 CLS
4199 PRINT "Resonant frequency -
";: BRIGHT 1: PRINT b;" MHz": B
RIGHT 0
4200 PLOT 25,100: DRAW 80,0: PLO
T 109,100: DRAW 80,0
4210 INK 2: PRINT AT 9,13;"O": I
NK 0
4220 PRINT AT 8,5;"<";AT 8,12;">
";AT 8,14;"<";AT 8,17;">"
4230 PRINT AT 8,3;"<"; FLASH 1;a
$; FLASH 0;;AT 8,12;">";AT 8,14;
"<"; FLASH 1;a$; FLASH 0;AT 8,23
;">",
4240 PRINT AT 6,3;"<    "; FLASH
 1;b$; FLASH 0;AT 6,23;">"
4250 PRINT ;;;;"Each leg is @
";a$;" long."
4260 PRINT ''"And the overall le
ngth should be";b$
4290 PRINT AT 21,14;"Copy?"
4291 IF INKEY$="" THEN GO TO 429
1
4292 IF INKEY$<>"y" THEN GO TO 4
294
4293 PRINT AT 21,14;"      ": COP
Y
4294 GO TO 100
7000 PRINT ;;;" Do you know the
velocity factorof the cable that
 you are using?"'';"Yes or No?"
7010 INPUT a$: IF a$<>"y" AND a$
<>"Y" THEN GO TO 7050
7020 PRINT ''"Enter the velocity
 percentage."
7030 INPUT b
7035 GO SUB 7900
7040 GO TO 7200
7100 CLS : PRINT "From this list
 enter the number corresponding
```

```
to your cable type"
7110 PRINT '"■ RG-8/U";TAB 16;"■
■ RG-58B/U"
7111 PRINT "■ RG-8/U FOAM";TAB 1
6;"■■ RG-58C/U"
7112 PRINT "■ RG-8A/U";TAB 16;"■
■ RG-59/U"
7113 PRINT "■ RG-9/U";TAB 16;"■■
 RG-59/U FOAM"
7114 PRINT "■ RG-9A/U";TAB 16;"■
■ RG-59A/U"
7115 PRINT "■ RG-9B/U";TAB 16;"■
■ RG-62/U"
7116 PRINT "■ RG-11/U";TAB 16;"■
■ RG-62A/U"
7117 PRINT "■ RG-11/U FOAM";TAB
16;"■■ RG-174/U"
7118 PRINT "■ RG-11A/U";TAB 16;"
■■ RG-213/U"
7119 PRINT "■■ RG-12/U";TAB 16;"
■■ RG-215/U"
7120 PRINT "■■ RG-12A/U";TAB 16;
"■■ RG-216"
7121 PRINT "■■ RG-17/U";TAB 16;"
■■ .5"" 50Ω"
7122 PRINT "■■ RG-17A/U";TAB 16;
"■■ .75"" 50Ω"
7123 PRINT "■■ RG-58/U";TAB 16;"
■■ .875"" 50Ω"
7124 PRINT "■■ RG-58/U FOAM";TAB
 16;"■■ .5"" 75Ω"
7125 PRINT "■■ RG-58A/U";TAB 16;
"■■ .75"" 75Ω"
7130 INPUT c
7135 CLS
7140 PRINT '''TAB 10;"Characteris
tics"
7150 PRINT '''"Impeadance-";TAB
25;y$(c,1);"Ω"
7160 PRINT '''"Velocity factor-";
TAB 25;y$(c,2);"%"
7170 PRINT '''"Capacitance per fo
ot-";TAB 25;y$(c,3);"pF"
7180 IF INT a=3 THEN LET d=4
7182 IF INT a=7 THEN LET d=5
7183 IF INT a=14 THEN LET d=6
7184 IF INT a=21 THEN LET d=7
7185 IF INT a=26 THEN LET d=8
7186 IF INT a=50 THEN LET d=9
7187 IF INT a=146 THEN LET d=10
7188 IF INT a=220 THEN LET d=11
7189 PRINT '''"Loss per 100'";TAB
 0;"at ";a;"MHz-";TAB 25;y$(c,d)
;"dB": PRINT '''"Electrical 1/4λ
"
7190 LET b=VAL y$(c,2): GO SUB 7
900: PRINT TAB 25;s$
7191 PRINT AT 21,0;"Do you want
info on baluns?"
7192 IF INKEY$="" THEN GO TO 719
2
7193 IF INKEY$="n" THEN GO TO 10
0
7200 CLS
7240 PRINT AT 0,25: DRAW 25,25,PI/4
7241 PLOT 58,25: DRAW 25,25,PI/4
7242 DRAW 0,100: DRAW -4,0: DRAW
 -4,0: DRAW 0,-100
7243 PRINT AT 16,0;"to";AT 19,0;
"trans"
7244 PRINT AT 2,14;"°"
7245 PLOT 79,150: DRAW 0,6: DRAW
 37,0:
7246 DRAW -15,0: DRAW 0,-106: DR
AW -16,0: DRAW 25,0: DRAW 0,100:
 DRAW -8,0
7247 PRINT AT 2,5;"°"
7248 PLOT 75,150: DRAW 0,6: DRAW
 -32,0
7249 PRINT AT 0,6;"Antenna"
7250 RESTORE 7250: DATA 49,47,52
7251 FOR n=7 TO 9: READ a: PRINT
 AT n,15;CHR$ a: NEXT n
7252 PRINT AT 8,17;"λ"
7253 LET n=19
7254 PRINT AT 3,n;"This type of"
;AT 4,n;"coaxial balun";AT 5,n;"
requires an";AT 6,n;"electrical"
7255 OVER 1: PRINT AT 6,n;"_____
_____": OVER 0
7256 PRINT AT 7,n;"1/4 λ stub be
"
7257 PRINT AT 8,n;"soldered";AT
9,n;"from sheild";AT 10,n;"to sh
ield at";AT 11,n;"the bottom &";
AT 12,n;"from shield";AT 13,n;"t
o center";AT 14,n;"at the top."
7259 PRINT AT 16,n;"In this case
";AT 17,n;"the stub is";AT 18,n
;s$
7260 PRINT AT 21,14;"Copy?"
7261 IF INKEY$="" THEN GO TO 726
1
7262 IF INKEY$<>"y" THEN GO TO 7
300
7263 PRINT AT 21,14;"      ": COP
Y
7300 CLS
7305 PRINT AT 2,9;"°";AT 2,10;"°
"
7310 PLOT 50,20: DRAW 25,25,PI/4
: PLOT 58,20: DRAW 25,25,PI/4: D
RAW 0,111: DRAW 0,-5: DRAW -5,0:
 DRAW 0,6: DRAW 0,-6: DRAW -3,0:
 DRAW 0,-106
7320 INK 2
7330 PLOT 70,151: DRAW 0,-102: D
RAW 16,0: DRAW 0,102
7335 INK 0
7340 PRINT AT 0,8;"Ant.";AT 18,0
;"to";AT 19,0;"trans."
7350 PRINT AT 3,13;"^";AT 15,13;
"|"
7360 PRINT AT 8,12;"1";AT 9,12;"
/λ";AT 10,12;"4"
7370 PRINT AT 2,n;"For this type
";AT 3,n;"of balun, a";AT 4,n;"m
etal sleave";AT 5,n;"is soldered
";AT 6,n;"t0 the sheild";AT 7,n;
"1/4 λ from";AT 8,n;"the end and
";AT 9,n;"left open at";AT 10,n;
"at the top.";AT 12,n;" The ante
nna";AT 13,n;"connects to";AT 14
,n;"the center &";AT 15,n;"the s
heild."
7380 PRINT AT 17,n;" The sleave"
;AT 18,n;"should be";AT 19,n;s$
7390 PRINT AT 21,14;"Copy?"
7391 IF INKEY$="" THEN GO TO 739
1
7392 IF INKEY$="y" THEN PRINT AT
 21,14;"      ": COPY
7400 CLS
7410 PLOT 50,25: DRAW 25,25,PI/4
: DRAW 0,100: DRAW 100,0: DRAW 0
,-50: DRAW -50,0,-PI: DRAW 0,50
7420 PLOT 58,25: DRAW 25,25,PI/4
: DRAW 0,100: DRAW 34,0: DRAW 0,
-50: DRAW 66,0,PI: DRAW 0,50: DR
AW -35,0: DRAW 0,-8
7430 PRINT AT 4,18;"▼"
7435 PRINT AT 1,9;"°";AT 1,22;"°
"
7440 DRAW 0,8: DRAW -28,0: DRAW
0,10
7450 DRAW -42,0: DRAW 0,4: DRAW
0,-14
7460 DRAW 100,0: DRAW 0,15
7470 PRINT AT 0,11;"to Antenna"
7480 PRINT AT 18,0;"to";AT 19,0;
"trans."
7485 LET q=q*2: GO SUB 7920
7486 LET t$=z$
7490 PRINT AT 14,14;" This balun
 uses a";AT 15,14;"1/2 λ stub an
d is";AT 16,14;"connected as sho
wn"
7491 PRINT AT 18,14;" This "; FL
ASH 1;"4:1"; FLASH 0;" balun is"
;AT 19,14;"";t$
7492 PRINT AT 21,14;"Copy?"
7493 IF INKEY$="" THEN GO TO 749
3
7494 IF INKEY$="y" THEN PRINT AT
 21,14;"      ": COPY
7495 GO TO 100
7900 LET b=b*.01
7910 LET q=(246*b)/a
7920 LET a1=INT q: LET aa1=q-a1
7940 GO SUB 400
7950 LET s$=z$
7960 RETURN
```

Repeater Directory
Advanced Software Designs
2905 Prescott
Garland, TX 75041
Written by - Bill Harris K5MIL

Repeater Directory is a program written for the Timex 2068 to aid in keeping track of and quick access to repeater information. I have made the program relatively user friendly, however some tutorial on its use will help. When the program is loaded, the following menu will be displayed.

1) SORT
2) SERACH
3) INPUT NEW DATA
4) DELETE RECORD
5) VIEW/PRINT RECORD
6) MODIFY RECORD
7) LOAD/SAVE
ENTER 1-7

NOTE: all entries must be made in upper case (caps lock on).

Selection 1 will bring up another menu which gives you 3 choices.
1) SORT BY CITY
2) SORT BY CALL
3) SORT BY STATE

The file will be sorted according to the selection. When the file is sorted, a code (1,2 or 3) is stored to a variable called SORT. This tells the program how the file has been sorted. For example; if the file has been sorted by city, a 1 is stored to SORT. If you try to sort the file again by city, you will get a message that the file is already sorted by city. NOTE: Sorts in basic are slow at best. I have 380 records in my file and the sort takes approximately 4 minutes. A good machine code sort routine here would really help. If any of you machine code buffs come up with one please let me know.

Selection 2 will bring up the following menu:
1) SEARCH BY CITY
2) SEARCH BY CALL
3) SEARCH BY STATE

From this menu you may enter a city name, callsign, or state you wish to search for. After the search, has found a match, the record is displayed and a new entry may be entered, or pressing the enter key will cause the search to continue, looking for the same information. If a match is not found, a message will be displayed and pressing enter will return you to the main menu.

Selection 3 will display the next empty record for data entry. A flashing cursor (›) will indicate the field that data is to be entered. Type in the required data and press enter. The cursor will now move to the next field. A field may be skipped by simply pressing enter without any data. After all fields have been entered, the program will ask you to varify that the information is correct, and then press enter. If any field needs to be changed, type the letter C and the cursor will move back to the first field. Press enter until the cursor points to the field to be corrected, and enter the correct data. Press enter until you are ask once again to varify the data. Pressing enter will now take you to the next blank record for entry. You may exit to the main menu at any time by typing QUIT. The last field in the record is the NOTE field. This is a one letter code that gives specific information about the repeater. The letter codes are; A-Autopatch, C-Closed Repeater, E-Emergency power, O-Carrier operated, P-Private autopatch, R-RACES affilliated, T-Touch Tone, W-Whistle, Y-RTTY, and Z-Direct access to law enforcement. Enter the letter code or codes that apply to the repeater and the information will be displayed. For example; A repeater you have just entered has an autopatch, emergency power capabilities, and is RACES affilliated. Enter in the NOTE field the letters AER. The program looks at the NOTE field and will display the comments according to the letter codes. Note: the variable SORT is reset to 0 in this routine to indicate that the file may not now be in the last order in which it was sorted.

Selection 4 will allow you to delete any record from the file. Type in the record number to be deleted, press enter, and the record will be deleted from the file.

Selection 5 will display the following menu:
1) VIEW RECORDS
2) PRINT RECORDS

VIEW: enter the record number and that record will be displayed. As indicated at the bottom the screen, pressing the F key will scroll the file to the next record, and pressing the B key will scroll the file to the previous record. Holding either key down will continue the scrolling. Pressing the M key will return to the main menu.

PRINT: will allow you to print any records for a given city. Type in the name of the city and all of the records for that city will be printed along with NOTE codes and comments.

Selection 6: enter the record number to change and that record will be displayed and any field can be changed. The format and data entry are the same as when you are inputting new data (selection 3). The SORT variable is reset to 0.

Selection 7: The file is saved in a character array named "RPTDIR". When doing a save, be sure and do not save over your program. The character array is the variable A$ and will hold 400 records. To do a load, simply place the tape in the recorder and select; 2) LOAD and press play. When the array has been loaded, the main menu will be displayed.

MORE NOTES

When entering into the OUTPUT field, you can just enter either a + or - sign and the program will calculate the offset frequency. If you make any modifications to the program, do not change any of the line numbers in lines 650-910. These are the statements that print the comments from the NOTE codes. Branching to these statements is accomplished by doing a VAL on the letter code and branching accordingly. So if these line numbers are changed, the correct comment will not be displayed.

The program is set up to print on an 80 column printer using a centronics interface. If you are using the Timex printer, you will have to change the lprint statements (lines 5470-5710) to properly format the output for that printer.

Record format:
```
CITY: GARLAND        STATE: TX
CALL: K5QHD
INPUT: 146.775
OUTPUT: 146.175
NOTES: Emergency power
       Autopatch
       RACES affilliated
```

Printer output format:

REPEATER DIRECTORY FOR GARLAND

CITY	ST	CALL	INPUT	OUTPUT	NOTES
GARLAND	TX	K5QHD	146.775	146.175	E
GARLAND	TX	K5QBM	147.84	147.24	RAZ

END OF LIST

NOTES:
A-AUTOPATCH B-BURST C-CLOSED REPEATER E-EMERGENCY POWER
O-CARRIER OPERATED P-PRIVATE AUTOPATCH R-RACES AFFILLIATED
T-TOUCH TONE W-WHISTLE T-RTTY Z-DIRECT ACC TO LAWENFORCE.

The ARRL repeater directory was the source used to input the repeater data. I have all of the repeaters in Texas entered into the file, and if I am taking a trip, I print out the cities I will be visiting or passing through. This gives me an easy to read list of the repeaters in those cities.

```
  8 DIM A$(401,65)
  9 LET SORT=0
 10 LET LR=1
 12 LET X=1
 14 LET Y=1
 16 LET N=1
 20 LET C=0
 22 GO TO 200
 30 IF LR=1 THEN GO TO 34
 32 RETURN
 34 PRINT AT 21,0;"FILE IS EMPT
 .PRESS ENTER": INPUT I$
 36 GO TO 200
 70 FOR A=1 TO LR-1
 72 FOR B=1 TO (LR-1)-A
 80 LET H$=A$(A)
 90 LET I$=A$(A+1)
 92 IF H$(A TO B)<=I$(A TO B) T
HEN GO TO 110
100 LET A$(A)=I$
104 LET A$(A+1)=H$
110 NEXT A
120 NEXT A
130 RETURN
200 FLASH 0: CLS
205 PRINT AT 2,7;"REPEATER DIRE
CTORY";AT 4,12;"**MENU**";AT 6,8
;"1) SORT",AT 8,8;"2) SEARCH";AT
 10,8;"3) INPUT NEW DATA";AT 12,
8;"4) DELETE RECORD";AT 14,8;"5)
 VIEW/PRINT RECORD";AT 16,8;"6)
CHANGE RECORD";AT 18,8;"7) LOAD/
SAVE";AT 21,0;"ENTER 1-7"
206 IF SORT=1 THEN PRINT AT 21,
16;"SORTED BY CITY"
210 IF SORT=2 THEN PRINT AT 21,
16;"SORTED BY CALL"
212 IF SORT=3 THEN PRINT AT 21,
16;"SORTED BY STATE"
215 INPUT A
218 IF A<1 OR A>9 THEN GO TO 20
0
220 GO TO A*1000
300 CLS
310 PRINT AT 0,8;"RECORD # ";N;
"  ": PRINT AT 2,0;"  CITY: ";A
$(N,1 TO 20): PRINT AT 2,22;"STA
TE: ";A$(N,19 TO 20): PRINT : PR
INT "  CALL: ";A$(N,21 TO 27): P
RINT : PRINT "  INPUT FREQ: ";A
$(N,28 TO 34): PRINT : PRINT "
OUTPUT FREQ: ";A$(N,35 TO 41)  P
RINT : PRINT "  NOTES: ";
320 FOR B=42 TO 52
324 LET D=CODE A$(N,B)
326 IF D=32 THEN GO TO 370
328 GO SUB D+10
330 NEXT B
360 GO TO RTN
370 PRINT TAB 10;"
          GO TO 330
400 FOR N=1 TO LR-1
410 IF A$(N,A TO A+L)=I$ THEN G
O TO 300
420 NEXT N
422 CLS
430 PRINT AT 10,8;"END OF LIST"
AT 12,8;"PRESS ENTER": INPUT I$
440 CLS
450 RETURN
460 IF D$(N)="R" THEN GO TO 490
470 LET N=N+1
475 IF N>25 THEN GO TO 510
480 GO TO 440
490 LET N=N-1
500 GO TO 440
510 LET N=N-1
515 FOR D=N TO 1 STEP -1
520 LET A=VAL D$(D)
525 PRINT "DELETE ";A$(A)
530 FOR E=A TO J-1
540 LET A$(E)=A$(E+1)
550 NEXT E
560 NEXT D
565 LET J=J-N
570 PRINT
580 PRINT "DELETE COMPLETE"
590 PRINT "PRESS ENTER"
592 INPUT B$
600 GO TO 200
650 LET B$="Autopatch
"
652 GO SUB 910
654 RETURN
660 LET B$="Burst
"
662 GO SUB 910
664 RETURN
670 LET B$="Closed-private repe
ater"
672 GO SUB 910
674 RETURN
690 LET B$="Emergency power
"
692 GO SUB 910
694 RETURN
790 LET B$="Carrier operated
"
792 GO SUB 910
794 RETURN
800 LET B$="Private autopatch
"
802 GO SUB 910
804 RETURN
820 LET B$="PACES activated
"
822 GO SUB 910
824 RETURN
840 LET B$="Touch-Tone
"
842 GO SUB 910
844 RETURN
870 LET B$="Whistle
"
872 GO SUB 910
874 RETURN
890 LET B$="RTTY
"
892 GO SUB 910
894 RETURN
900 LET B$="Direct access to
": GO SUB 910
902 LET B$="law enforcement": G
O SUB 910
904 RETURN
910 PRINT TAB 9;B$: RETURN
1000 CLS
1002 GO SUB 30
1010 PRINT AT 10,8;"1) SORT BY C
ITY";AT 12,8;"2) SORT BY CALL";A
T 14,8;"3) SORT BY STATE";AT 21,
0;"ENTER 1-3"
1012 INPUT I$
1020 IF I$="1" THEN GO TO 1100
1030 IF I$="2" THEN GO TO 1200
1040 IF I$="3" THEN GO TO 1300
1050 GO TO 10130
1100 CLS
1105 GO TO 1350
1110 PRINT AT 10,4;"SORTING BY C
ITY"
1115 LET SORT=1
1120 LET A=1: LET B=20
1130 GO SUB 1400
1140 FLASH 0: PRINT AT 10,4;"SOR
T COMPLETE  ": BEEP .5,20: PAUSE
 50: GO TO 200
1200 CLS
1205 GO TO 1355
1210 PRINT AT 10,4;"SORTING BY C
ALL"
1215 LET SORT=2
1220 LET A=21: LET B=27
1230 GO SUB 1400
1240 PRINT AT 10,4;"SORT COMPLET
E  ": BEEP .5,20: PAUSE 50: GO T
O 200
1300 CLS
1305 GO TO 1360
1310 PRINT AT 10,4;"SORTING BY S
TATE"
1315 LET SORT=3
1320 LET A=19: LET B=20
1330 GO SUB 1400
1340 PRINT AT 10,4;"SORT COMPLET
E  ": BEEP .5,20: PAUSE 50
 GO TO 200
1350 CLS
1352 IF SORT=1 THEN GO TO 1380
1354 GO TO 1110
1356 IF SORT=2 THEN GO TO 1382
1358 GO TO 1210
1360 IF SORT=3 THEN GO TO 1384
1362 GO TO 1310
1380 PRINT "FILE ALREADY SORTED
BY CITY": BEEP .5,20: PAUSE 75
GO TO 200
1382 PRINT "FILE ALREADY SORTED
BY CALL": BEEP .5,20: PAUSE 75
GO TO 200
1384 PRINT "FILE ALREADY SORTED
BY STATE": BEEP .5,20: PAUSE 75
 GO TO 200
1400 LET S=1
1410 LET S=S*2
1420 IF S<=LR=1 THEN GO TO 1410
1430 LET S=INT (S/2)
1440 IF S=0 THEN RETURN
1450 FOR T=1 TO (LR-1)-S
1460 LET Y=T
1470 LET W=Y+S
1480 IF A$(Y,A TO B)<=A$(W,A TO
B) THEN GO TO 1520
1490 LET Z$=A$(Y): LET A$(Y)=A$(
W): LET A$(W)=Z$
1500 LET Y=Y-S
1510 IF Y>0 THEN GO TO 1470
1520 NEXT T
1530 GO TO 1430
2000 CLS
2002 GO SUB 30
2010 PRINT AT 10,8;"1) SEARCH BY
 CITY";AT 12,8;"2) SEARCH BY CAL
L";AT 14,8;"3) SEARCH BY STATE";
AT 21,0;"ENTER 1-3"
2020 INPUT I$
2030 IF I$="1" THEN GO TO 2100
2040 IF I$="2" THEN GO TO 2200
2050 IF I$="3" THEN GO TO 2300
2052 GO TO 2020
2100 CLS
2104 LET RTN=2140
2110 PRINT AT 21,0;"ENTER CITY N
AME FOR SEARCH": INPUT I$
2120 LET L=LEN I$-1: LET A=1
2130 GO SUB 400
2140 PRINT AT 20,0;"ENTER NEW NA
ME FOR SEARCH";AT 21,0;"OR M FOR
 MENU                  ": INPUT B$
2150 IF B$="M" THEN GO TO 200
2154 IF CODE B$=0 THEN GO TO 420
2160 LET I$=B$: GO TO 2120
2200 CLS
2204 LET RTN=2240
2210 PRINT AT 10,4;"ENTER CALL F
OR SEARCH": INPUT I$
2220 LET L=LEN I$-1: LET A=21
2230 GO SUB 400
2240 PRINT AT 20,0;"ENTER NEW CA
LL FOR SEARCH";AT 21,0;"OR M FOR
 MENU                  ": INPUT B$
2250 IF B$="M" THEN GO TO 200
2254 IF CODE B$=0 THEN GO TO 420
2260 LET I$=B$: GO TO 2220
2300 CLS
2304 LET RTN=2340
2310 PRINT AT 10,4;"ENTER STATE
FOR SEARCH": INPUT I$
2320 LET L=LEN I$-1: LET A=19
2330 GO SUB 400
2340 PRINT AT 20,0;"ENTER NEW ST
ATE FOR SEARCH";AT 21,0;"OR M FO
R MENU                ": INPUT B$
2350 IF B$="M" THEN GO TO 200
2354 IF CODE B$=0 THEN GO TO 420
2360 LET I$=B$: GO TO 2320
3000 CLS
3001 IF LR>400 THEN GO TO 3400
3002 LET N=LR
3004 LET RTN=3020
3010 GO TO 300
3020 FLASH 1: PRINT AT 2,1;">"
3030 INPUT I$
3031 LET SORT=0
3032 IF I$="QUIT" THEN GO TO 200
3034 IF CODE I$=0 THEN GO TO 305
0
3040 LET A$(N,1 TO 18)=I$
3050 LET RTN=3061
3060 FLASH 0: GO TO 310
3061 FLASH 1: PRINT AT 2,21;">"
3062 INPUT I$
3063 IF I$="QUIT" THEN GO TO 200
3064 IF CODE I$=0 THEN GO TO 307
0
3065 LET A$(N,19 TO 20)=I$
3066 LET RTN=3070
3067 FLASH 0: GO TO 310
3070 FLASH 1: PRINT AT 4,1;">"
3090 INPUT I$
3091 IF I$="QUIT" THEN GO TO 200
3092 IF CODE I$=0 THEN GO TO 309
6
3094 LET A$(N,21 TO 27)=I$
```

```
3098  LET RTN=3110
3100  FLASH 0: GO TO 310
3110  FLASH 1: PRINT AT 8,1;
3120  INPUT I$
3121  IF I$="QUIT" THEN GO TO 200
3122  IF CODE I$=0 THEN GO TO 312
0
3124  LET A$(N,25 TO 34)=I$
3125  LET RTN=3140
3130  FLASH 0: GO TO 310
3140  FLASH 1: PRINT AT 8,1;"
3150  INPUT I$
3151  IF I$="QUIT" THEN GO TO 200
3152  IF CODE I$=0 THEN GO TO 315
0
3154  IF I$="-" THEN GO TO 3300
3155  IF I$="+" THEN GO TO 3300
3156  LET A$(N,35 TO 41)=I$
3158  LET RTN=3170
3160  FLASH 0: GO TO 310
3170  FLASH 1: PRINT AT 10,1;"
3180  INPUT I$
3181  IF I$="QUIT" THEN GO TO 200
3182  IF CODE I$=0 THEN GO TO 318
0
3186  LET A$(N,42 TO 54)=I$
3188  LET RTN=3196
3190  FLASH 0: GO TO 310
3196  IF "-" THEN RETURN
3200  LET LR=LR+1
3206  LET N=N-1
3220  PRINT AT 21,0;"VERIFY INPUT
 THEN PRESS ENTER": INPUT I$
3224  IF LR>400 THEN GO TO 3400
3230  IF I$="D" THEN GO TO 3260
3250  LET RTN=3020: GO TO 300
3260  LET LR=LR-1
3268  GO TO 3002
3300  LET F=VAL A$(N,28 TO 34)+.5
3310  LET A$(N,35 TO 41)=STR$ F
3320  GO TO 3158
3330  LET F=VAL A$(N,28 TO 34)+.5
3340  LET A$(N,35 TO 41)=STR$ F
3350  GO TO 3158
3400  CLS
3410  PRINT AT 10,8;"FILE IS FULL
": PRINT AT 11,8;"PRESS ENTER"
3420  INPUT I$: GO TO 200
4000  CLS
4002  GO SUB 30
4010  CLS: PRINT AT 20,0;"ENTER
RECORD NUMBER TO DELETE": PRINT
"OR M FOR MENU": INPUT I$
4020  IF I$="M" THEN GO TO 200
4030  LET A=VAL I$
4040  FOR N=A TO LR-1
4050  LET A$(N)=A$(N+1)
4060  IF N=LR THEN GO TO 4080
4070  NEXT N
4080  LET LR=LR-1
4082  IF LR<=1 THEN GO TO 4100
4090  PRINT AT 21,0;"RECORD ";A
;"DELETED": PAUSE 100
4094  GO TO 4000
4100  CLS: LET LR=1: PRINT AT 10
,4;"ALL RECORDS DELETED";AT 21,0
;"PRESS ENTER": INPUT I$
4120  GO TO 200
5000  CLS
5001  GO SUB 30
5002  PRINT AT 10,6;"1) VIEW RECO
RDS";AT 12,6;"2) PRINT RECORDS"
AT 21,0;"ENTER 1-2": INPUT I$
5004  IF I$="1" THEN GO TO 5010
5006  IF I$="2" THEN GO TO 6300
5008  GO TO 5002
5010  PRINT AT 21,0;"ENTER RECORD
 NUMBER": INPUT N
5020  LET RTN=5040
5030  GO TO 300
5040  PRINT AT 21,0;"F=FWD  B=BAC
K  M=MENU"
5050  IF INKEY$="" THEN GO TO 505
0
5052  LET I$=INKEY$
5060  IF I$="F" THEN GO TO 6080
5062  IF I$="B" THEN GO TO 5200
5064  IF I$="M" THEN GO TO 200
5070  GO TO 5050

5080  LET N=N+1
5090  IF N>=LR THEN GO TO 5120
5100  LET RTN=5110: GO TO 310
5110  GO TO 5040
5120  PRINT AT 20,0;"END OF FILE=
5130  LET N=LR-1: GO TO 5040
5200  PRINT AT 20,1;"
  LET N=N-1
5210  IF N<=1 THEN GO TO 5240
5220  LET RTN=5230: GO TO 310
5230  GO TO 5040
5240  LET N=1: GO TO 5020
5300  CLS
5310  PRINT AT 1,0;"ENTER NAME OF
 FILE TO PRINT"
5320  LET A=1: INPUT I$
5400  PRINT AT 2,0;"PRINTING RECO
RDS FOR ";I$
5410  GO SUB 5700
5420  LET L=LEN I$-1
5430  FOR N=1 TO LR-1
5440  IF A$(N,A TO A+L)=I$ THEN G
O TO 5470
5460  NEXT N
5464  GO TO 5480
5470  LPRINT A$(N,1 TO 20);TAB 22
;A$(N,21 TO 27);"    ";A$(N,28
O 34);"    ";A$(N,35 TO 41);"
  ";A$(N,42 TO 52)
5474  GO TO 5460
5480  LPRINT : LPRINT TAB 25;"END
 OF LIST": LPRINT : LPRINT : LPR
INT "NOTES:": LPRINT "A-AUTOPATC
H";TAB 16;"B-BURST";TAB 25;"C-CL
OSED REPEATER";TAB 45;"E-EMERGEN
CY POWER"
5484  LPRINT "O-CARRIER OPERATED"
;TAB 25;"P-PRIVATE AUTOPATCH";TA
B 45;"R-RACES AFFILLIATED"
5486  LPRINT "T-TOUCH TONE";TAB 1
5;"W-WHISTLE";TAB 28;"Y-RTTY";TA
B 36;"Z-DIRECT ACCESS TO LAW ENF
ORCEMENT"
5490  LPRINT : LPRINT : LPRINT
5494  GO TO 200
5700  LPRINT TAB 15;"REPEATER DIR
ECTORY FOR ";I$: LPRINT : LPRINT

5710  LPRINT "CITY";TAB 22;"CALL"
;TAB 33;"INPUT";TAB 44;"OUTPUT";
TAB 55;"NOTES": LPRINT "--------
--------------------------------
----------------------"
5720  RETURN
6000  CLS
6001  GO SUB 30
6002  LET C=1
6010  PRINT AT 21,0;"ENTER RECORD
 NUMBER TO CHANGE": INPUT I$
6020  IF I$="M" THEN GO TO 200
6030  LET N=VAL I$
6040  IF N>LR-1 THEN
6050  GO SUB 3004
6060  PRINT AT 21,0;"ENTER NEW RE
C # OR M FOR MENU": INPUT I$
6070  IF I$="M" THEN GO TO 6100
6080  IF I$="" THEN GO TO 6060
6090  GO TO 6030
6100  LET C=0: GO TO 200
7000  CLS
7010  PRINT AT 10,8;"1) SAVE DATA
";AT 12,8;"2) LOAD DATA";AT 21,0
;"ENTER 1-2": INPUT I$
7020  IF I$="1" THEN GO TO 7050
7030  IF I$="2" THEN GO TO 7060
7040  GO TO 7010
7050  LET A$(401,1 TO 3)=STR$ LR:
 LET A$(401,4)=STR$ SORT: SAVE "
APTDIR" DATA A$(): GO TO 200
7060  PRINT AT 20,0;"PLACE TAPE I
N RECORDER": PRINT "PRESS PLAY"
: LOAD "APTDIR" DATA A$()
7064  LET LR=VAL A$(401,1 TO 3):
LET SORT=VAL A$(401,4): GO TO 20
0
9000  SAVE "APTDIR  LINE 4
```

73, W4GHV & K5XY

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